HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Programs:	Upper Skagit Hatchery
Species or Hatchery Stock:	Skagit Chum/Oncorynchus Keta
Agency/Operator:	Upper Skagit Indian Tribe
Watershed and Region:	Skagit River WRIA Region 4
Date Submitted:	October 2, 2000
Date Last Updated:	November 12, 2003

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program/ Upper Skagit Hatchery

1.2) Species and population (or stock) under propagation, and ESA status.

State common and scientific names. /Skagit Chum Salmon, Onorhynechus Keta (not currently listed under Endangered Species Act)

1.3) Responsible organization and individuals.

Name (and title): Scott Schuyler, Fisheries Director

Agency or Tribe: Upper Skagit Indian Tribe
Address: 25944 Community Plaza Way
Sedro Woolley WA. 98284
Telephone: (360) 854-7000
Fax: (360) 854-7004
Email: sschuyler@upperskagit.com

Formatted: Not Highlight

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program: This program is tribally owned and operated by the Upper Skagit Tribe.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

The Bureau of Indian Affairs is the current funding source for the Upper Skagit Hatchery .This facility is operated with one full-time and one part-time position each. The operational budget for this hatchery is $60,000 per fiscal year of which $30,000 is BIA hatchery operation and maintenance.

Deleted: 9

1.5) Location(s) of hatchery and associated facilities. *

Include name of stream, river kilometer location, basin name, and state. Also include watershed code (e.g. WRIA number), regional mark processing center code, or other sufficient information for GIS entry. See "Instruction E" for guidance in responding.

The Upper Skagit Hatchery is located on the Upper Skagit Reservation near the city of Sedro Woolley in the State of Washington in Skagit WRIA Region , GPS location: 48 degrees 32.336N/122 degrees 11.160W. The Upper Skagit Hatchery is water supply source is Red Creek # 268 which is on Skagit River kilometer 36.62.

1.6) Type of program.

Define as either: Integrated Recovery; Integrated Harvest; Isolated Recovery; or Isolated Harvest (see Attachment 1 - Definitions" section for guidance). Cultural and Environmental Educational Program.

1.7) Purpose (Goal) of program.

Define as either: Augmentation, Mitigation, Restoration, Preservation/Conservation, or Research (for Columbia Basin programs, use NPPC document 99-15 for guidance in providing these definitions of "Purpose"). Provide a one-sentence statement of the goal of the program, consistent with the term selected and the response to Section 1.6. Example: "The goal of this program is the restoration of spring chinook salmon in the White River using the indigenous stock".

- The goal of this program is to increase the harvestable numbers of chum salmon returning to the Skagit River**.**
- Maintain genetic diversity
- To provide for the educational needs of the Upper Skagit Tribe.
- To enhance cultural education of tribal youth.
- Provide forum for environmental learning for tribal youth.

1.8) Justification for the program.

Indicate how the hatchery program will enhance or benefit the survival of the listed natural population (integrated or isolated recovery programs), or how the program will be operated to provide fish for harvest while minimizing adverse effects on listed fish (integrated or isolated harvest programs).

No effect on the listed population. The chum fishery occurs more than a month after the last chinook has spawned in the river.

1.9) List of program "Performance Standards".

"Performance Standards" are designed to achieve the program goal/purpose, and are generally measurable, realistic, and time specific. The NPPC "Artificial Production Review" document attached with the instructions for completing the HGMP presents a list of draft "Performance Standards" as examples of standards that could be applied for a hatchery program. If an ESU-wide hatchery plan including your hatchery program is available, use the performance standard list already compiled.

- Involve 150 kids in hatchery education program.
- Give cultural learning course for tribal youth.
- Achieve 80% egg to released fry.
- Hatchery production contributes to harvest and maintains Tribal Treaty harvest rights by providing surplus for terminal area fisheries.
- Host kids educational salmon day May.
- Tribal chum net fishery November-December.
- Limit genetic and ecological impacts to natural population to acceptable levels.
- Achieve annual brood capture goal per hatchery management plan.
- Broodstock collection shall be carried out to minimize changes in morphological, behavioral and life history traits.
- Brood collection occurs over 80% of natural run return time.
- Release practices do not alter the timing of the timing of the immigrant adults.
- Rearing practices do not alter the morphological characteristics of hatchery production significantly (in mean or variation) from characteristics of natural spawners.
- Broodstock collection shall be carried out to minimize changes in morphological, behavioral and the life history traits.
- Release practices do not alter the spawning in the distribution in area and time of HOR returns from the NOR distribution.
- The number of adults for broodstock remains above the minimum effective population size.
- The hatchery production and practices do not alter the genetic characteristics of the NOR population.
- There is no trend over time in the genetic diversity NOR returns.

Example: " (1) Conserve the genetic and life history diversity of Upper Columbia River spring chinook populations through a 12 year duration captive broodstock program; (2) Augment, restore and create viable naturally spawning populations using supplementation and reintroduction strategies; (3) Provide fish to satisfy legally mandated harvest in a manner which minimizes the risk of adverse effects to listed wild populations; (4)....".

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

"Performance Indicators" determine the degree that program standards have been achieved, and indicate the specific parameters to be monitored and evaluated. Adequate monitoring and evaluation must exist to detect and evaluate the success of the hatchery program and any risks to or impairment of recovery of affected, listed fish populations.

The NPPC "Artificial Production Review" document referenced above presents a list of draft "Performance Indicators" that, when linked with the appropriate performance standard, stand as examples of indicators that could be applied for the hatchery program. If an ESU-wide hatchery plan is available, use the performance indicator list already compiled. Essential 'Performance Indicators" that should be included are monitoring and evaluation of overall fishery contribution and survival rates, stray rates, and divergence of hatchery fish morphological and behavioral characteristics from natural populations.

The list of "Performance Indicators" should be separated into two categories: "benefits" that the hatchery program will provide to the listed species, or in meeting harvest objectives while protecting listed species; and "risks" to listed fish that may be posed by the hatchery program, including indicators that respond to uncertainties regarding program effects associated with a lack of data.

1.10.1) "Performance Indicators" addressing benefits.

(E.g. "*Evaluate smolt-to-adult return rates for program fish to harvest, hatchery broodstock, and natural spawning.*"). Data required to evaluate catch return of adult chum has not been collected to date due to budgetary and staff constraints.

1.10.2) "Performance Indicators" addressing risks.

(*e.g. "Evaluate predation effects on listed fish resulting from hatchery fish releases."*).

No anticipated predation effects on listed population.

1.11) Expected size of program.

In responding to the two elements below, take into account the potential for increased fish production that may result from increased fish survival rates affected by improvements in hatchery rearing methods, or in the productivity of fish habitat. The program expected size is a total of 450,000 chum fry released each year into the Skagit River.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish). 400 adults maximum per year will be caught during broodstocking.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

(*Use standardized life stage definitions by species presented in* Attachment 2).

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		

Life Stage	Release Location	Annual Release Level
Fry	Upper Skagit River mile RM 36 GPS Location: 48 degrees 31.472N/122 degrees 00.766W	450,000
Fingerling		
Yearling		

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.
Provide estimated smolt-to-adult survival rate, total adult production number, and escapement number (to the hatchery and natural areas) data available for the most recent twelve years (roughly three fish generations), or for the number of years of available and dependable information. Indicate program goals for these parameters. This data would require collection of large-scale treaty fishery sampling, which has not been collected due to high associated cost. There is not a current rack return site to evaluate adult return.

1.13) Date program started (years in operation), or is expected to start. The chum salmon program began in 1990.

1.14) Expected duration of program. This program has no targeted end date and is expected to continue as long as funding permits.

1.15) Watersheds targeted by program. Skagit River WRIA 4.
Include WRIA or similar stream identification number for desired watershed of return.

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed. No other alternative actions have been evaluated to date.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program. Future brood document, Skagit Memorandum of Understanding with the State of Washington.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area. No expected take of listed population during operation of program.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.
Include information describing: adult age class structure, sex ratio, size range, migrational timing, spawning range, and spawn timing; and juvenile life history strategy, including smolt emigration timing. Emphasize spatial and temporal distribution relative to hatchery fish release locations and weir sites
The Skagit runs of the Puget Sound chinook ESU are the ESA-listed populations in the Skagit Basin. Refer to the 1992 Washington State Salmon and Steelhead Stock Inventory (SASSI), Appendix 1, pgs 137-173 for biological information about these populations.

- Identify the ESA-listed population(s) that will be directly affected by the program.
(Includes listed fish used in supplementation programs or other programs that involve integration

of a listed natural population. Identify the natural population targeted for integration). No direct affect to the listed population.

- Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program. *(Includes ESA-listed fish in target hatchery fish release, adult return, and broodstock collection areas).* . There is no overlap in adult run timing between the hatchery chum and listed chinook in the Skagit River.

2.2.2) <u>Status of ESA-listed salmonid population(s) affected by the program.</u>

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds (*see definitions in "Attachment 1")*. These thresholds have not been quantified for Skagit Chinook. For management, critical and "recovery" (equivalent to "viable") escapement levels were proposed for both Skagit summer/fall and Skagit spring chinook. Escapements to date have always been above the proposed critical and "recovery" escapement levels for both runs. See Comprehensive Chinook an SASSI

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data. Refer to the Puget Sound Salmon Stock Review Group Report 1997 (PFMC, Portland, OR) for these data. Egg to migrant fry survival rates are shown on pg 3-11, and other productivity data appear on pgs 6-1 to 6-4.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data. *(Include estimates of juvenile habitat seeding relative to capacity or natural fish densities, if available).*
Previously provided. Refer to Documents submitted to the ESA Administrative Record for West Coast chinook salmon by C. Smith, January, March, and September 1997 (cited as WDFW 1997b in the Chinook Status Review).

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.
Hatchery-origin chinook from the Skagit Hatchery have been recovered on spawning grounds only in the vicinity of the hatchery. In broodstock collections in the Upper Skagit (described in the WDFW HGMP), somewhat less than 1% of fish collected have been hatchery-origin spring chinook. At the Baker River trap (RM 47), hatchery-origin chinook from as far away as Robertson Creek on the West Coast of Vancouver Island have been recovered every year. Typically 5% to 10% of the fish caught at the Baker trap (about 300 per year) bear CWT's from such regions as Robertson Creek, Capilano, Nooksack, Stillaguamish, and Guemes Channel. None of these CWT's have been recovered yet from carcasses on the spawning grounds, but intensive sampling of spawning grounds carcasses started only 2 years ago. Thus, other than the < 1% noted for hatchery springs in the Upper Skagit broodstock collections, there are no estimates of hatchery-origin fish on natural spawning grounds in the Skagit.

2.2.3) <u>Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take</u> *(see "Attachment 1" for definition of "take")***.**
- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for

their occurrence, and the likely effects of the take.
(*e.g. "Broodstock collection directed at sockeye salmon has a "high" potential to take listed spring chinook salmon, through migrational delay, capture, handling, and upstream release, during trap operation at Tumwater Falls Dam between July 1 and October 15. Trapping and handling devices and methods may lead to injury to listed fish through descaling, delayed migration and spawning, or delayed mortality as a result of injury or increased susceptibility to predation*"). Take is highly unlikely. Broodstock collection occurs after chinook spawning is completed; chum release occurs in Swinomish Channel, which is not on the main outmigration route of Skagit wild juveniles; juvenile chum are not known to prey on salmon; and the fishery for adult chum occurs after chinook spawning is completed. There may be some immature chinook caught in the chum fishery in Skagit Bay (preseason modeling projects an AEQ of about 8 Skagit chinook/yr), but, since the fisheries are managed for wild chum, not the hatchery chum that result from this program, these chinook would be caught whether this program existed or not.

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
None known.

- **Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**
*Complete the appended "take table" (**Table 1**) for this purpose. Provide a range of potential take numbers to account for alternate or "worst case" scenarios.*
None expected, for all life stages and categories of take (see Table 1).

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.
(*e.g. "The number of days that steelhead are trapped at Priest Rapids Dam will be reduced if the total mortality of handled fish is projected in season to exceed the 1988-99 maximum observed level of 100 fish."*)
If more than 2 live chinook, that are not spawned out, are caught during broodstocking, the collection activities will be delayed until the next week.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies. *(e.g. "The hatchery program will be operated consistent with the ESU-wide plan, with the exception of age class at release. Fish will be released as yearlings rather than as sub-yearlings as specified in the ESU-wide plan, to maximize smolt-to-adult survival rates given extremely low run sizes the past four years.")*. This hatchery plan is being operated consistent with the Future Brood Document and the Wild Salmonid Policy

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies. See 3.1. No known discrepancies with future brood document, Skagit Memorandum of Understanding, and Co-Managers Disease Policy.

3.3) Relationship to harvest objectives.

Explain whether artificial production and harvest management have been integrated to provide as many benefits and as few biological risks as possible to the listed species. Reference any harvest plan that describes measures applied to integrate the program with harvest management. There is very little risk to the listed species due to the run timing differences between the chum and Chinook.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available. *Also provide estimated future harvest rates on fish propagated by the program, and on listed fish that may be taken while harvesting program fish* . This program provides additional surplus chum salmon for treaty net fisheries in Washington Department of Fish and Wildlife Area 8 and 78-D (Skagit Bay and Skagit River). The program benefits the non-treaty net and sport fisheries in the same areas.

3.4) Relationship to habitat protection and recovery strategies.

Describe the major factors affecting natural production (if known). Describe any habitat protection efforts, and expected natural production benefits over the short- and long-term. For Columbia Basin programs, use NPPC document 99-15, section II.C. as guidance in indicating program linkage with assumptions regarding habitat conditions. Flooding of the Skagit River and the associated river scouring is one of the largest factors affecting natural production.

3.5) Ecological interactions.

Describe salmonid and non-salmonid fishes or other species that could (1) negatively impact program; (2) be negatively impacted by program; (3) positively impact program; and (4) be positively impacted by program. Give most attention to interactions between listed and "candidate" salmonids and program fish. 1). None known. 2). None known 3) none known 4). The program could provide additional fry as feed to the listed Chinook population, Coho and Steelhead.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

For integrated programs, identify any differences between hatchery water and source, and "natal" water used by the naturally spawning population. Also, describe any methods applied in the hatchery that affect water temperature regimes or quality. Include information on water withdrawal permits, National Pollutant Discharge Elimination System (NPDES) permits, and compliance with NMFS screening criteria. The water source for the Upper Skagit Hatchery is Red Creek #268 which source is mostly snow melt during the spring and surface run off during the winter and fall. The creek now becomes completely dry during the months of July through December due to the loss of shade tree cover from logging that has occurred over the last 15years. The creek water is compatible with salmon rearing conditions during the months when water is available with temperatures ranging from 40 degrees Fahrenheit the winter months of December and January to 59 degrees during the spring months of May and June. The dissolved oxygen levels in the creek remain at a constant level of 11 to 12 parts per million during months that water is available. The hatchery back up water supply has been used in the past to manipulate

temperature regimes for the purpose of thermal marking the otoliths for identification purposes. Currently the back up water supply is non-functional.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.
(e.g. "Hatchery intake screens conform with NMFS screening guidelines to minimize the risk of entrainment of juvenile listed fish."). The listed chinook population has not been found to enter into the hatchery water source (Red Creek) due to the small creek size and creek blockages near the Skagit River. No expected risk from the effluent which flows into Red Creek. No risk aversion measures needed.

SECTION 5. FACILITIES

Provide descriptions of the hatchery facilities that are to be included in this plan (see "Guidelines for Providing Responses" Item E), including dimensions of trapping, holding incubation, and rearing facilities. Indicate the fish life stage held or reared in each. Also describe any instance where operation of the hatchery facilities, or new construction, results in destruction or adverse modification of critical habitat designated for listed salmonid species.

5.1) Broodstock collection facilities (or methods). The broodstock are captured by drifting a small meshed tangle net in the Skagit River. The fish are then quickly removed from the net and held in aluminum live pens until ready to transport to the Upper Skagit Hatchery.

5.2) Fish transportation equipment (description of pen, tank truck, or container used). The transport tank is a 650 gallon fiberglass tank with single baffle and 8 inch discharge pipe outlet mounted on 1985 Ford F-600 flat bed truck. The live holding pens are 3ft wide by 3ft deep by 4ft constructed out of 2inch aluminum pipe with ¼ inch mesh net.

5.3) Broodstock holding and spawning facilities. The adult salmon are transported to the Upper Skagit Hatchery and are then held in four fiberglass 12ft wide 3ft deep circular tanks until they are ready for spawning.

5.4) Incubation facilities. The chum eggs are incubated in heath for incubators at the Upper Skagit Hatchery. The incubators are stacked 12 trays high and housed in the incubation shed which is 10 foot wide by 60 foot long.

5.5) Rearing facilities. The Upper Skagit Hatchery rearing facilities consist of 2 four foot wide by 3 foot deep circular tanks, 4-12 foot wide three foot deep circular tanks.

5.6) Acclimation/release facilities. Chum fry are directly released from Upper Skagit hatchery.

5.7) Describe operational difficulties or disasters that led to significant fish mortality. The largest losses at the Upper Skagit hatchery have been caused by silt and other high water conditions such as debris entering the hatchery intake and fouling screens, valves and pipes which causes the water flow to stop or reduce to critical low levels which results in fish loss.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury

or mortality.
(e.g. "The hatchery will be staffed full-time, and equipped with a low-water alarm system to help prevent catastrophic fish loss resulting from water system failure."). No back up systems in place to specifically protect listed population.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.
List all historical sources of broodstock for the program. Be specific (e.g., natural spawners from Bear Creek, fish returning to the Loon Creek Hatchery trap, etc.). The Skagit Native Chum broodstock have been collected in the Skagit River between the towns of Hamilton and Lyman since the program began (November 1990 to present day).

6.2) Supporting information.

6.2.1) History.
Provide a brief narrative history of the broodstock sources. For listed natural populations, specify its status relative to critical and viable population thresholds (use section 2.2.2 if appropriate). For existing hatchery stocks, include information on how and when they were founded, sources of broodstock since founding, and any purposeful or inadvertent selection applied that changed characteristics of the founding broodstock. See 6.1. The native chum broodstock have been collected directly from the Skagit River since the program conception.

6.2.2) Annual size.
Provide estimates of the proportion of the natural population that will be collected for broodstock. Specify number of each sex, or total number and sex ratio, if known. For broodstocks originating from natural populations, explain how their use will affect their population status relative to critical and viable thresholds. 0.25 – 1.0 percent of total population has been collected for broodstock purposes. The targeted sex ratio is 1-1 during the collection process. Data not available on effect to natural population, critical and viable thresholds.

6.2.3) Past and proposed level of natural fish in broodstock.
If using an existing hatchery stock, include specific information on how many natural fish were incorporated into the broodstock annually. The same target level of natural fish as in past years to present.

6.2.4) Genetic or ecological differences.
Describe any known genotypic, phenotypic, or behavioral differences between current or proposed hatchery stocks and natural stocks in the target area. None known.

6.2.5) Reasons for choosing.
Describe any special traits or characteristics for which broodstock was selected. The goal of the program was to produce Skagit Native Chum.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.
(e.g. "*The risk of among population genetic diversity loss will be reduced by selecting the*

indigenous chinook salmon population for use as broodstock in the supplementation program."). The broodstock collection occurs in the Skagit River during the time period when the listed population is no longer in the area where broodstocking is occurring.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles). Adult Chum.

7.2) Collection or sampling design.
Include information on the location, time, and method of capture (e.g. weir trap, beach seine, etc.) Describe capture efficiency and measures to reduce sources of bias that could lead to a non-representative sample of the desired broodstock source. The broodstock process starts the second week of November and continues until the second week of December. The collection site is the Skagit Mainstream between river miles 40 and 44. The capture method efficiency is very high since chum tend to get caught easily in the drift tangle net. No additional measures are taken to reduce sample bias.

7.3) Identity.
Describe method for identifying (a) target population if more than one population may be present; and (b) hatchery origin fish from naturally spawned fish. (a) No other population present. (b) No data has been collected.

7.4) Proposed number to be collected: 400

7.4.1) Program goal (assuming 1:1 sex ratio for adults): The program goal is to collect 200 males and 200 females.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1988					
1989					
1990	250	250			
1991	250	250			
1992	250	250			
1993	250	250			
1994	250	250			
1995	250	250			
1996	250	250			
1997	250	250			

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1998	250	250			
1999	250	250			
2000	250	250			

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.
Describe procedures for remaining within programmed broodstock collection or allowable upstream hatchery fish escapement levels, including culling. In the past any remaining fish after program egg take have been surplused to tribal members.

7.6) Fish transportation and holding methods.
Describe procedures for the transportation (if necessary) and holding of fish, especially if captured unripe or as juveniles. Include length of time in transit and care before and during transit and holding, including application of anesthetics, salves, and antibiotics. All unripe fish are transported live to the Upper Skagit Hatchery for holding until ready to spawn.

7.7) Describe fish health maintenance and sanitation procedures applied. The fish are cleaned of blood with a 1-% iodine solution before the eggs or milt is removed.

7.8) Disposition of carcasses.
Include information for spawned and unspawned carcasses, sale or other disposal methods, and use for stream reseeding. The spawned fish carcasses are smoked and then are dispersed to tribal members.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.
(e.g. "The risk of fish disease amplification will be minimized by following Co-manager Fish Health Policy sanitation and fish health maintenance and monitoring guidelines"). No anticipated risk to the listed population from the chum program broodstock collection.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.
Specify how spawners are chosen (e.g. randomly over whole run, randomly from ripe fish on a certain day, selectively chosen, or prioritized based on hatchery or natural origin). The brood are sorted twice a week and females that are ready to spawn are then removed from the holding area and killed and bled. The males are selected randomly and a spawning sex ratio of 1-1 is the targeted goal.

8.2) Males.
Specify expected use of backup males, precocious males (jacks), and repeat spawners. No

expected use of backup males or jacks.

8.3) Fertilization.
Describe spawning protocols applied, including the fertilization scheme used (such as equal sex ratios and 1:1 individual matings; equal sex ratios and pooled gametes; or factorial matings). Explain any fish health and sanitation procedures used for disease prevention. The spawning protocol is 1-1 sex ratio with groups of 5 females pooled and then fertilized with the sperm of 5 males. After fertilization the eggs are soaked in a 1ppm iodine solution for sterilization purposes.

8.4) Cryopreserved gametes.
If used, describe number of donors, year of collection, number of times donors were used in the past, and expected and observed viability. Not used.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.
(*e.g. "A factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the small chum salmon population that is the subject of this supplementation program".*). None taken, no anticipated risk to the listed species from the hatchery chum mating scheme.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals. The hatchery egg to smolt survival goal is 80%.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.
Provide data for the most recent twelve years (1988-99), or for years dependable data are available.
1991 400,000 eggs taken, 70% estimated to eye up.
1992 550,000 eggs taken, 85% estimated to eye up.
1993 550,000 eggs taken, 85% estimated to eye up
1994 550,000 eggs taken, 85% estimated to eye up.
1995 550,000 eggs taken, 85% estimated to eye up.
1996 550,000 eggs taken, 85% estimated to eye up.
1997 260,000 eggs taken, 85% estimated to eye up.
1998 550,000 eggs taken, 85% estimated to eye up.
1999 250,000 eggs taken, 85% estimated to eye up.
2000 550,000 eggs taken, 85% estimated to eye up

9.1.2) Cause for, and disposition of surplus egg takes.
Describe circumstances where extra eggs may be taken (e.g. as a safeguard against potential incubation losses), and the disposition of surplus fish safely carried through to the eyed eggs or fry stage to prevent accedence of programmed levels. The targeted egg take for the program is 450,000 eggs which is 50,000 higher than the program level.

9.1.3) Loading densities applied during incubation.
Provide egg size data, standard incubator flows, standard loading per Heath tray (or other incubation density parameters). No egg size data available. The heath tray flows are set at 2-3

gallons per minute for incubation. The loading density for the trays is 6,000 eggs

9.1.4) Incubation conditions.per tray maximum.
Describe monitoring methods, temperature regimes, minimum dissolved oxygen criteria (influent/effluent), and silt management procedures (if applicable), and any other parameters monitored. During the incubation period the temperature is recorded daily. During the incubation period the temperature is monitored daily and the incubation regime is 39 degrees Fahrenheit during the coldest period to 46 during the warmest period. The dissolved oxygen level is monitored weekly to ensure that the minimum threshold of 7ppm is achieved for egg and alevin survival with the optimum range of 9-12ppm.

9.1.5) Ponding.
Describe degree of button up, cumulative temperature units, and mean length and weight (and distribution around the mean) at ponding. State dates of ponding, and whether swim up and ponding are volitional or forced. The chum fry are monitored throughout the course of their incubation period by weekly visual inspections and when they have achieved 90% button up status they are then force ponded from the heath incubators into a 6ft circular fiberglass tank. The 90% button up is usually achieved after they have subjected to 900 temperature units while in the incubators.

9.1.6) Fish health maintenance and monitoring.
Describe fungus control methods, disease monitoring and treatment procedures, incidence of yolk-sac malformation, and egg mortality removal methods. If the eggs are experiencing an unacceptable rate of mortality (greater than 5%) due to fungus smothering the eggs they are then treated with a 01% formalin drip directly into the incubator for fifteen minutes a day and this will continue until the fungus is under control. The incidence rate of yolk-sac malformation is estimated to be at or less than 5% of the total population. After the eggs have a set of clearly visible eyes which occurs after being subjected to approximately 400 temperature units the eggs can be safely handled. At this point the eggs that have died are removed from the incubators by hand. If any incubator has experienced a high mortality rate the eggs are then removed and placed in the Jensorter, which removes the dead eggs mechanically by using light and a jet of air while in the sorting process.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.
(*e.g. "Eggs will be incubated using well water only to minimize the risk of catastrophic loss due to siltation.")* No risk aversion measures taken because listed fish probably not affected by program.

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.. Data not available due to lack of sampling of retuning fish.

9.2.2) Density and loading criteria (goals and actual levels).
Include density targets (lbs fish/gpm, lbs fish/ft3 rearing volume, etc).

9.2.3) Fish rearing conditions
(Describe monitoring methods, temperature regimes, minimum dissolved oxygen, carbon dioxide,

total gas pressure criteria (influent/effluent if available), and standard pond management procedures applied to rear fish) The salmon fry at the hatchery are monitored seven days a week. The fry are weigh sampled every week during the rearing period. The temperature regimes for rearing are between 46 degrees and 58 degrees Fahrenheit. The minimum dissolved oxygen level for rearing is 9 parts per million..

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available. The fry are ponded at 0.41 gram average and are released at 0.95 gram average.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available. Not available.
Contrast fall and spring growth rates for yearling smolt programs. If available, indicate hepatosomatic index (liver weight/body weight) and body moisture content as an estimate of body fat concentration data collected during rearing.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*). The feed used is Biodiet Starter and Biodiet Grower. The estimated total conversion rate is 1.09.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures. Each year, fish pathologists screen a representative number of adults returning to tribal hatcheries for pathogens that may be transmitted to the progeny. The exact number of fish to be tested from each stock is specified in the Co-managers Salmonid Control Policy. Pathologists work with hatchery crews to help avoid pre-spawning mortality of brood fish to maximize fertilization and egg survival. Preventative care is also promoted through routine juvenile fish health monitoring. Pathologists conduct fish health exams at each of the tribal hatcheries on a monthly basis from the time juvenile's swim-up until they are released as smolts. Monthly monitoring exams include an evaluation of rearing conditions as well as lethal sampling of small numbers of juvenile fish to assess the health status of the population and to detect pathogens of concern. Results are reported to hatchery managers along with any recommendations for improving or maintaining fish health. Vaccine produced by the TFHP may be used when appropriate to prevent the onset of two bacterial diseases (vibriosis or enteric redmouth disease). In the event of disease epizootics or elevated mortality in a stock, fish pathologists are available to diagnose problems and provide treatment recommendations. Pathologists work with hatchery crews to ensure the proper use of drugs and chemicals for treatment. The entire health history for each hatchery stock is maintained in a relational database called AquaDoc. (Northwest Indian Fisheries Commission Fish Pathology pers.comm.). Co-managers disease policy and guidelines are followed disease treatment and sanitation procedures.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable. N/A

9.2.9) Indicate the use of "natural" rearing methods as applied in the program. Not used

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation. (*e.g. "Fish will be reared to sub-yearling smolt size to mimic the natural fish emigration strategy and to minimize the risk of domestication effects that may be imparted through rearing to yearling size.")* None

taken. Not likely to affect listed population.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.
Specify any management goals (e.g. number, size or age at release, population uniformity, residualization controls) that the hatchery is operating under for the hatchery stock in the appropriate sections below.
The goal of the program is to release 500,000 fry at minimum of 0.77 grams each into the upper Skagit River at approximately RM 36 This involves fish being trucked the short distance from the hatchery to the Skagit River release location.

10.1) Proposed fish release levels. *(Use standardized life stage definitions by species presented in **Attachment 2**. "Location" is watershed planted (e.g. "Elwha River").)*

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry	450,000	350fpp	May 25	Skagit River, approx. RM 36 GPS Location 48 degrees 31.47N 122 degrees 00.766W
Fingerling				
Yearling				

10.2) Specific location(s) of proposed release(s). Upper Skagit River, WIRA 4
Stream, river, or watercourse: *(include name and watershed code (e.g. WRIA) number* Skagit River
Release point: 48 degrees 31 minutes 31.47 seconds North
122 degrees 29 minutes 00.766 seconds West
Major watershed: Skagit River
Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.
*For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in **Attachment 2**. Cite the data source for this information.*

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1992			231,602	.77 gms				
1993			478,936	1.26 gms				
1994			308,672	.77 gms				
1995			371,891	.84 grms				
1996			394,753	.96 grms				
1997			467,180	.89 grms				

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1998			209,000	.99 grms				
1999			461,687	1.11 grms				
Average			365,465	.95grms				

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

10.4) Actual dates of release and description of release protocols.

Provide the recent five year release date ranges by life stage produced (mo/day/yr). Also indicate the rationale for choosing release dates, how fish are released (volitionally, forced, volitionally then forced) and any culling procedures applied for non-migrants. The protocol for release is achieving the .77gram average.

Chum Fry Release Dates:
May 25, 1995
May 31, 1996
May 19, 1997
May 15, 1998
May 21, 1999
2000
2001

Fish are volitionally released until 70% are gone then remaining fish are then forced.

10.5) Fish transportation procedures, if applicable.

Describe fish transportation procedures for off-station release. Include length of time in transit, fish loading densities, and temperature control and oxygenation methods. Fish are transferred the short distance from the hatchery to the upper Skagit River release location (Red Creek #268 confluence with the Skagit River, approximately RM 36) where fish are released all at once.

10.6) Acclimation procedures (*methods applied and length of time***).**

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults. 100% of the hatchery population is marked with a teriymycin mark prior to release.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels. No surplus fish to date at time of release.

10.9) Fish health certification procedures applied pre-release. One pre-release examination by Northwest Indian Fisheries Commission fish health staff required prior to actual liberation.

10.10) Emergency release procedures in response to flooding or water system failure. No current back up system in place.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

(*e.g. "All yearling coho salmon will be released in early June in the lower mainstem of the*

Green River to minimize the likelihood for interaction, and adverse ecological effects, to listed natural chinook salmon juveniles, which rear in up-river areas and migrate seaward as sub-yearling smolts predominately in May"). No risk aversion measures taken.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

This section describes how "Performance Indicators" listed in Section 1.10 will be monitored. Results of "Performance Indicator" monitoring will be evaluated annually and used to adaptively manage the hatchery program, as needed, to meet "Performance Standards".

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program. Current funding levels are not adequate to staff monitoring, or evaluation of program.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.
(*e.g. "The Wenatchee River smolt trap will be continuously monitored, and checked every eight hours, to minimize the duration of holding and risk of harm to listed spring chinook and steelhead that may be incidentally captured during the sockeye smolt emigration period.)"* None taken.

SECTION 12. RESEARCH

Provide the following information for any research programs conducted in ***direct association with the hatchery program described in this HGMP. Provide sufficient detail to allow for the independent assessment of the effects of the research program on listed fish****. If applicable, correlate with research indicated as needed in any ESU hatchery plan approved by the co-managers and NMFS. Attach a copy of any formal research proposal addressing activities covered in this section. Include estimated take levels for the research program with take levels provided for the associated hatchery program in* ***Table 1****.*

12.1) Objective or purpose: No current research being conducted.
Indicate why the research is needed, its benefit or effect on listed natural fish populations, and broad significance of the proposed project.

12.2) Cooperating and funding agencies. None.

12.3) Principal investigator or project supervisor and staff. Scott Schuyler.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2. N/A

12.5) Techniques: include capture methods, drugs, samples collected, and tags applied. N/A

12.6) Dates or time period in which research activity occurs. N/A

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods. N/A

12.8) Expected type and effects of take and potential for injury or mortality. N/A

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1). N/A

12.10) Alternative methods to achieve project objectives. N/A

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project. N/A

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities. N/A
(*E.g. "Listed coastal cutthroat trout sampled for the predation study will be collected in compliance with NMFS Electrofishing Guidelines to minimize the risk of injury or immediate mortality.").*

SECTION 13. ATTACHMENTS AND CITATIONS

Include all references cited in the HGMP. In particular, indicate hatchery databases used to provide data for each section. Include electronic links to the hatchery databases used (if feasible), or to the staff person responsible for maintaining the hatchery database referenced (indicate email address). Attach or cite (where commonly available) relevant reports that describe the hatchery operation and impacts on the listed species or its critical habitat. Include any EISs, EAs, Biological Assessments, benefit/risk assessments, or other analysis or plans that provide pertinent background information to facilitate evaluation of the HGMP. N/A

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook	**ESU/Population: Puget Sound**		**Activity: Upper Skagit Ch**	
Location of hatchery activity: Upper Skagit	**Dates of activity: Nov to May**		**Hatchery program operator: Scott Schuyl**	
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of F***			
	Egg/Fry	Juvenile/Smolt	Adult	
Observe or harass a)	0	0	0	
Collect for transport b)	0	0	0	
Capture, handle, and release c)	0	0	0	
Capture, handle, tag/mark/tissue sample, and release d)	0	0	0	
Removal (e.g. broodstock) e)	0	0	0	
Intentional lethal take f)	0	0	0	
Unintentional lethal take g)	0	0	0	
Other Take (specify) h)	0	0	0	

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.